

**CLAIMS**

1. An analyser or spectrophotometer for the detection of material in a sample comprising:

5 a source adapted to direct radiation at least at said sample, the radiation incident on or reflected by said sample able to be varied;

a detector for detecting at least radiation reflected by said sample, wherein said detector having a spectral response able to be varied and an output depending on radiation incident thereon and said spectral response;

10 a controller or processor receiving said output, configured or programmed to vary the intensity of said source;  
vary the spectral response of said detector; and  
determine a characteristic of said sample based on said output in relation to said variations.

15 2. An analyser or spectrophotometer for the detection of material in a sample comprising:

means for directing radiation at said sample;

means for varying the radiation incident on or reflected by said sample;

20 means for detecting at least radiation reflected by said sample;

means for providing a variable spectral response output representative of said detected reflected radiation; and

means for determining a characteristic of said sample based on said output in relation to said variations.

25 3. A method of detecting material in a sample comprising the steps of directing radiation at said sample;

varying the radiation incident on or reflected by said sample;

detecting at least radiation reflected by said sample;

30 providing a variable spectral response output representative of said detected radiation; and

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determining a characteristic of said sample based on said output in relation to said variations.

4. An analyser, spectrophotometer or method as claimed in any one of claims 1 to 3 wherein the radiation directed at said sample is varied by varying the voltage or current supplied to the radiation source.
5. An analyser, spectrophotometer or method as claimed in any one of claims 1 to 3 wherein the radiation directed at said sample is varied by varying the transmission path between the radiation source and said sample.
6. An analyser, spectrophotometer or method as claimed in claim 5 wherein the transmission path is varied by varying the size of the aperture through which radiation is directed at said sample.
7. An analyser, spectrophotometer or method as claimed in claim 6 wherein the size of the aperture is varied by a rotating wheel with different sized apertures through which is directed at said sample.
8. An analyser, spectrophotometer or method as claimed in any one of claims 1 to 3 wherein the radiation directed at said sample is varied by the variation in intensity when switching the radiant source on or by pulsing the radiation source.
9. An analyser, spectrophotometer or method as claimed in any one of claims 1 to 3 wherein the radiation reflected by said sample is detected by a photodiode and the spectral response of said output is varied by varying the width of the depletion zone within said diode.
10. An analyser, spectrophotometer or method as claimed in claim 9 wherein the width of the depletion zone within said diode is varied by varying the reverse voltage applied across the diode and the output being the resulting current.

11. An analyser, spectrophotometer or method as claimed in any one of claims 1 to 3 wherein said output signal from said detector is amplified and digitised prior to being supplied to said controller.

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12. An analyser, spectrophotometer or method as claimed in claim 11 wherein said controller is a microprocessor.

13. An analyser, spectrophotometer or method as claimed in claim 11 wherein  
10 said detector is a photodiode detector.

14. An analyser, spectrophotometer or method as claimed in claim 11 wherein said source is a light emitting diode.

15 15. An analyser, spectrophotometer or method as claimed in claim 11 wherein said source is a tungsten filament lamp.

16. An analyser, spectrophotometer or method as claimed in claim 11 wherein said source is a gas discharge lamp.

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17. An analyser or spectrophotometer for the detection of material in a sample comprising:

a source adapted to direct radiation at least at said sample;

a detector configured to provide an output indicative of at least radiation

25 reflected by said sample;

a variable transmission path for radiation between said source, said sample or said detector;

a controller or processor receiving said output and operating said transmission path, configured or programmed to

30 determine the radiation reflected from said source off said sample;

determine the radiation directly from said source; and

determine a characteristic of said sample based on said output in relation to variations in said transmission path.

18. An analyser or spectrophotometer for the detection of material in a sample  
5 comprising:  
means for directing radiation at said sample;  
means for detecting at least radiation reflected by said sample;  
means for detecting at least radiation directly from said source; and  
means for determining a characteristic of said sample based on said reflected  
10 radiation in relation to said direct radiation.

19. A method of detecting material in a sample comprising the steps of  
directing radiation at said sample;  
detecting at least radiation reflected by said sample;  
15 detecting at least radiation directly from said source; and  
determining a characteristic of said sample based on said reflected radiation  
in relation to said direct radiation.

20. A analyser, spectrophotometer or method as claimed in any one of one claims  
20 17 to 19 wherein said radiation reflects off said sample along a sample path and  
radiation passes directly to the detector along a reference path.

21. An analyser, spectrophotometer or method as claimed in claim 20 wherein a  
blocking member having at least 3 cyclic modes  
25 a first mode during which said radiation passes said reference path,  
a second mode during which said radiation passes said sample path, and  
a third mode during which said radiation is blocked.

22. An analyser, spectrophotometer or method as claimed in claim 21 wherein  
30 said blocking member is rotatable about a central axis.

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23. An analyser, spectrophotometer or method as claimed in claim 22 wherein during said first mode the intensity of said radiation through said sample path is varied.

5 24. An analyser, spectrophotometer or method as claimed in claim 23 wherein the intensity is varied by providing different sized apertures in an annular path through said blocking member.

10 25. An analyser, spectrophotometer or method as claimed in claim 24 wherein said blocking member includes indexing and a sensor(s) detect the position of said blocking member.

26. An analyser substantially as described as any of the embodiments herein with reference to and as illustrated by any of the accompanying drawings.

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27. A spectrophotometer substantially as described as any of the embodiments herein with reference to and as illustrated by any of the accompanying drawings.

20 27. A method of analysing a sample substantially as described as any of the embodiments herein.